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March 26, 2003

Via Federal Express
Eileen Furey, Esquire
Office of Regional Counsel (C-14-J)
United States Environmental
Protection Agency
Region V
77 W. Jackson Blvd.
Chicago, IL 60604

RE: Kalamazoo River Superfund Site

Dear Eileen:

On behalf of the Kalamazoo River Study Group, I am enclosing a letter which Limno-Tech, Inc. sent to CH2M-Hill concerning the PCB mass estimates for the exposed sediments in the Plainwell and Ostego City Impoundment. Although Limno-Tech and the FIELDS group have made progress in working together on many issues, the method of geostatistical interpolation used by the FIELDS group overstates the PCB mass in the impoundments, particularly at depth. We believe that the LTI method of interpolation is more accurate and scientifically justified and request that it be included in the RI that CH2M Hill is drafting. We also request that the enclosed information be included in the administrative record for the Site.

As always, feel free to telephone me with any questions. Best regards.

Very truly yours,

Bonnie

Bonnie Allyn Barnett

Enclosure
/jg

cc: Ms. Shari Kolak
J. Michael Davis, Esquire
Ms. Joyce Schlesinger
Mr. Paul A. Montney

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Limno-Tech, Inc.
Excellence in Environmental Solutions Since 1975

March 26, 2003

Mr. Jeff Keiser
CH2M-Hill
135 S. 84th St.
Suite 325
Milwaukee, WI 53214

Subject: Transmittal of calculated PCB mass by layer, Plainwell and Otsego City Impoundments

Dear Mr. Keiser,

This letter serves to transmit our estimates of PCB mass by layer for the Plainwell and Otsego City Impoundment exposed sediments, based on our final interpolations of all applicable PCB data. This letter serves as a hard copy follow-up to our email of March 24, 2003. It is our understanding that EPA plans to use the FIELDS interpolation, in its current form, in the RI. Given our view, described below, that the FIELDS analysis overestimates the PBC mass, especially at depth, we request that the LTI analysis also be included in the draft RI report.

The estimates summarized in the attached spreadsheet are based on our most current interpolation methods, which involve the following steps: coordinate straightening to account for the irregular shape of the impoundment, kriging of log-transformed PCB, and back-transformation and bias correction to provide estimates of mean concentrations throughout the two impoundments. The current methods are essentially the same as those we discussed with you and the EPA FIELDS group at our meeting in Chicago on November 1, 2002. Since that time, we have adopted the final dataset circulated by FIELDS in early December (email: Vilma Rivera-Carrero, 12/4/02), and have added the final step of bias correction to address concerns that our methods provide local estimates of the geometric mean, rather than the true (arithmetic) mean.

Our methods are consistent with the best current practice in geostatistical interpolation, and as such represent a reasonable estimate of the distribution of PCB in the impoundments. Our methods have been reviewed and endorsed by Dr. Noemi Barabas, a geostatistician and researcher at the University of Michigan.

As noted in our email, our comparisons with EPA's interpolations show significant differences, particularly at depth. As we have expressed to you, we do not believe the interpolation methods utilized by FIELDS reflect the actual PCB mass present in the exposed sediments. Major differences can be characterized as follows:

Vertical extrapolation: in a number of cases, cores show low or decreasing concentrations in the surface layers, and no data at depth. We have used such data to infer locations that are unlikely to have high concentrations at depth, and constrained our interpolation accordingly. This was not done in the FIELDS interpolation, resulting in PCB mass and concentration estimates at depth that are, in many cases, based upon no actual data, unrealistic and in error.

Outward extrapolation: In a number of locations, isolated data are used in the FIELDS interpolation to extrapolate concentration estimates out to the edge of the impoundment (notably, Otsego City, near KPT 79). Because the natural neighbor method used by FIELDS does not take into account the spatial correlation structure of the PCB data, the range to which such concentrations can be extrapolated is unlimited, and produces unrealistic estimates of PCB mass and concentration in several cases.

Effects of PCB Distribution: The natural neighbor method as applied by FIELDS tends to emphasize high concentration data in terms of their influence on neighboring areas. This can be seen clearly in maps of the FIELDS interpolation results with data superimposed, in which low concentration data appear to have very limited influence on interpolated concentrations in the vicinity of higher concentration data. While the natural neighbor method is in itself a valid interpolation method, we would argue that in this application the disproportionate influence of high concentration samples results in an unreasonable upward bias in estimates of SWAC and mass.

We value the collaborative efforts taken by FIELDS, CH2M-Hill, and LTI to date, including the development of a common, reviewed dataset, discussions regarding appropriate data reduction and interpolation methods, and comparisons of final results. These efforts have contributed significantly to the good faith advancement of the project, and we feel that the FIELDS group in particular has done much to contribute to an atmosphere of openness and high technical standards. We hope to continue with this approach in the future.

We would be happy to discuss any element of our analysis and conclusions with you.

Regards,
Limno-Tech, Inc.

Timothy J. Dekker, Ph.D., P.E.
Senior Project Engineer

Gregory W. Peterson
Vice President

PLAINWELL

Top Depth	Bottom Depth	Min. Conc.	Max Conc.	Density	FIELDS OriginalResults Volume (cu yd)	FIELDS OriginalResults Mass (lbs)	LTI Results using FIELDS Data Volume (cu yd)	LTI Results using FIELDS Data Mass (lbs)	LTI Results using LTI GSLIB Kriging Volume (cu yd)	LTI Results using LTI GSLIB Kriging Mass (lbs)
LAYER 1										
0	6	0	0.33	2000	1,268.5	0.2	672.2	0.2	964 8	0.4
0	6	0.33	1	2000	1,490.7	2.1	1,458.3	2.0	1,892.6	2.5
0	6	1	2	2000	3,003.7	8.8	2,953.7	8.6	3,661 1	11.1
0	6	2	5	2000	7,879.6	55.2	7,800.0	54.6	9,229.6	63.8
0	6	5	10	2000	9,814 8	145.1	9,705.6	143.4	11,244 4	167.3
0	6	10	25	2000	21,390.7	718.9	21,250.0	714.4	13,651 9	424.0
0	6	25	150	2000	7,316.7	525.7	7,281.5	523.3	6,057.4	443.2
Subtotals:					52,164.8	1,455.9	51,122.2	1,446.6	46,701.9	1,112.4
LAYER 2										
6	12	0	0 33	2000	447 1	0 1	323 0	0 1	1,149 3	0.5
6	12	0 33	1	2000	3,218 2	4 9	3,180 9	4 8	4,225 9	5.7
6	12	1	2	2000	5,987 2	17 8	5,944 6	17 7	8,363 0	25 2
6	12	2	5	2000	9,841 6	64 6	9,729 0	63 8	18,309 3	115.3
6	12	5	10	2000	10,350 9	153.4	10,255.3	152.0	6,737.0	95.3
6	12	10	25	2000	10,624 3	342.2	10,587 9	340.3	5,681 5	180.5
6	12	25	150	2000	10,215 3	823.4	10,137 0	816.3	2,759 3	233 8
Subtotals:					50,684.6	1,408.4	50,137.8	1,395.0	47,225.3	656.3
LAYER 3										
12	24	0	0 33	2000	4,577 1	2.3	4,337 6	2.3	5,783 5	2.5
12	24	0 33	1	2000	25,161 0	31 3	24,918.5	31 0	34,930 5	49 1
12	24	1	2	2000	17,708 1	49 7	17,577 6	49 3	25,416 2	68 8
12	24	2	5	2000	18,818 8	120 1	18,707 6	119 4	14,995 9	95 9
12	24	5	10	2000	9,222 1	132.2	9,155 7	131 3	7,317 4	101 1
12	24	10	25	2000	13,132.6	423 8	13,063 9	421 3	2,591 5	74 8
12	24	25	150	2000	5,074 9	425 2	5,005 7	418 2	2,288 9	202.9
Subtotals:					93,694.6	1,184.6	92,766.6	1,172.8	93,323.9	595 2
LAYER 4										
24	36	0	0 33	2000	15 379 4	5 1	15,101 3	5 0	30,850 6	11 3
24	36	0 33	1	2000	23,883 6	30 6	23,754 1	30 5	31 718 9	38 1
24	36	1	2	2000	16 375 2	47 8	16,231 2	47 4	12,559 5	34 8
24	36	2	5	2000	11,900 0	73 3	11,863 0	73 0	7,152 6	42 8
24	36	5	10	2000	3 817 0	53 0	3,798 4	52 8	1,649 3	22 7
24	36	10	25	2000	3 527 2	109 5	3 512 6	109 1	1,211 1	41 5
24	36	25	150	2000	1,333 3	97 9	1,288 9	93 5	1,074 1	80 8
Subtotals:					76,215.7	417.2	75,549.6	411 3	86,216.1	271.9
LAYER 5										
36	48	J	0 33	2000	12,106 6	3 9	14,200 0	5 0	51,092 6	17 0
36	48	0 33	1	2000	19 638 7	25 0	24,055 6	30 6	20,559 3	22 0
36	48	1	2	2000	10 017 1	28 6	12,200 0	34 5	3,777 8	10 1
36	48	2	5	2000	5,810 3	33 9	7,444 4	45 0	1,285 2	7 3
36	48	5	10	2000	664 0	8 8	918 5	12 4	344 4	4 9
36	48	10	25	2000	211 1	6 9	196 3	6 4	233 3	5 8
36	48	25	150	2000	503 7	65 7	481 5	62 4	0 0	0 0
Subtotals:					48,951.5	172.8	59,496.3	196.3	77,292.6	67.1
LAYER 6										
48	60	0	0 33	2000	9,573 5	2.1	6,572 4	2.1	19,217 4	6 3
48	60	0 33	1	2000	2,226 9	2.6	2,226 9	2.6	5,354 8	6 0
48	60	1	2	2000	969 7	2 9	969 7	2.9	649 9	1 6
48	60	2	5	2000	1 863 3	12.5	1,859 6	12.5	313 7	2 1
48	60	5	10	2000	1,657 9	24 6	1,654.2	24 6	0 0	0 0
48	60	10	25	2000	3,297 6	96 8	3,250 2	96 6	0 0	0 0
48	60	25	150	2000	2,798 3	318 4	2,764 8	313 8	0 0	0 0
Subtotals:					22,387.2	459.9	19,337.7	454.9	25,535.8	16.0
GRAND TOTALS:					344,098.5	5,096.9	348,410.3	5,077.0	376,295.5	2,719.0

OTSEGO CITY

Top Depth	Bottom Depth	Min. Conc.	Max. Conc.	Density	FIELDS OriginalResults Volume (cu yd)	FIELDS OriginalResults Mass (lbs)	LTI Results using FIELDS Data Volume (cu yd)	LTI Results using FIELDS Data Mass (lbs)	LTI Results using LTI GSLIB Kriging Volume (cu yd)	LTI Results using LTI GSLIB Kriging Mass (lbs)
LAYER 1										
0	6	0	0.33	2000	65,496.3	11.7	62,042.6	11.7	109,600.0	22.9
0	6	0.33	1	2000	32,533.3	42.1	32,290.7	41.8	38,600.0	48.4
0	6	1	2	2000	39,538.9	118.4	39,290.7	115.7	28,124.1	75.8
0	6	2	5	2000	46,646.3	298.9	46,253.7	294.4	37,703.7	241.3
0	6	5	10	2000	36,418.5	534.7	36,222.2	531.9	14,846.3	209.8
0	6	10	25	2000	11,298.7	294.6	11,227.8	293.5	5,318.5	140.5
0	6	25	150	2000	5,218.5	518.9	5,118.5	508.6	585.2	41.1
Subtotals:					237,118.5	1,815.4	232,446.3	1,797.5	232,777.8	779.8
LAYER 2										
6	12	0	0.33	2000	105,266.6	25.4	101,857.5	25.2	136,717.4	35.2
6	12	0.33	1	2000	43,494.4	50.8	43,201.9	50.5	54,770.4	66.3
6	12	1	2	2000	17,855.6	50.9	17,751.9	50.6	19,925.9	54.0
6	12	2	5	2000	17,631.5	115.6	17,524.1	114.9	13,051.9	82.6
6	12	5	10	2000	19,240.7	284.8	19,127.8	283.1	5,724.1	80.4
6	12	10	25	2000	18,720.4	609.5	18,620.4	606.4	2,033.3	58.4
6	12	25	150	2000	14,783.3	1,403.0	14,638.9	1,385.4	235.2	15.6
Subtotals:					236,992.7	2,539.9	232,722.4	2,516.1	232,458.1	392.5
LAYER 3										
12	24	0	0.33	2000	274,614.7	62.4	258,900.6	62.1	380,438.9	97.4
12	24	0.33	1	2000	63,033.9	74.9	62,742.4	74.5	50,031.6	52.4
12	24	1	2	2000	32,765.6	92.6	32,451.0	91.6	10,869.4	30.3
12	24	2	5	2000	34,814.8	225.9	34,470.4	223.7	6,370.4	40.6
12	24	5	10	2000	20,325.9	284.0	20,137.0	281.3	3,418.5	48.4
12	24	10	25	2000	26,311.1	806.6	26,070.4	800.0	977.8	28.2
12	24	25	150	2000	9,574.1	623.6	9,566.7	623.2	55.6	3.2
Subtotals:					461,440.3	2,169.9	442,338.4	2,156.3	452,162.2	300.5
LAYER 4										
24	36	0	0.33	2000	303,308.8	68.8	296,887.1	68.3	326,988.1	54.2
24	36	0.33	1	2000	18,572.4	22.6	18,324.7	22.3	1,655.3	1.7
24	36	1	2	2000	2,033.8	5.6	2,015.0	5.6	396.3	1.1
24	36	2	5	2000	1,370.4	8.6	1,355.6	8.5	400.0	2.7
24	36	5	10	2000	577.8	7.9	566.7	7.7	222.2	3.1
24	36	10	25	2000	296.3	9.6	292.6	9.5	59.3	1.4
24	36	25	150	2000	0.0	0.0	0.0	0.0	0.0	0.0
Subtotals:					326,159.4	123.0	319,441.6	121.9	329,719.1	64.1
LAYER 5										
36	48	0	0.33	2000	72,609.3	7.5	136,111.1	13.2	203,614.8	29.5
36	48	0.33	1	2000	277.8	0.3	277.8	0.3	0.0	0.0
36	48	1	2	2000	42.2	0.1	44.4	0.1	0.0	0.0
36	48	2	5	2000	0.0	0.0	0.0	0.0	0.0	0.0
36	48	5	10	2000	0.0	0.0	0.0	0.0	0.0	0.0
36	48	10	25	2000	0.0	0.0	0.0	0.0	0.0	0.0
36	48	25	150	2000	0.0	0.0	0.0	0.0	0.0	0.0
Subtotals:					72,929.3	7.9	136,433.3	13.6	203,614.8	29.5
LAYER 6										
48	60	0	0.33	2000	NA	NA	NA	NA	13,513.9	1.5
48	60	0.33	1	2000	NA	NA	NA	NA	0.0	0.0
48	60	1	2	2000	NA	NA	NA	NA	0.0	0.0
48	60	2	5	2000	NA	NA	NA	NA	0.0	0.0
48	60	5	10	2000	NA	NA	NA	NA	0.0	0.0
48	60	10	25	2000	NA	NA	NA	NA	0.0	0.0
48	60	25	150	2000	NA	NA	NA	NA	0.0	0.0
Subtotals:					NA	NA	NA	NA	13,513.9	1.5
GRAND TOTALS:					1,334,640.3	6,656.1	1,363,382.0	6,605.6	1,464,246.0	1,568.1